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REMARKS

Claims 1, 5-9, 11-14, 18, 20-27 and 31-41 are pending in the present application. Claims 2-4, 10, 15-17, 19, and 28-30 are cancelled. New claims 37-41 have been added. Support for new claims 37-40 may be found at least on page 4, 2nd paragraph; page 25, 2nd and 3rd paragraphs; and the originally filed claims. Support for new claim 41 may be found at least on page 25, 4th paragraph of the specification and the original claims. Claims 1, 5, 11, 13, 14 and 18 have been amended to address formal issues and/or clarify the claims. The amendments to the claims in no way change the scope of the claims. Entry of the new claims and the amendments to the pending claims is respectfully requested.

Restriction of the Claims

The Examiner maintains the position that the method of performing a one-pot reaction of Group I, is distinct from the method of preparing chemical libraries of Group III and from the kit of Group V. Applicants again traverse this restriction because claims 1 and 15 recite the same features. In addition, the kit of claim 19 recites the same compound as that recited in claim 1. As such, it is unclear to Applicants how the search would differ for the indicated groups.

However, in the interest of facilitating prosecution of the application, Applicants have cancelled the non-elected claims,

while reserving the right to pursue the non-elected subject matter in one or more divisional applications.

Rejections of the claims under 35 U.S.C. §112, 2nd paragraph

Claim 1 has been rejected under 35 U.S.C. §112, 2nd paragraph with the assertion that the terms "non-metal substrate" and "non-metal substrate compound" are relative and indefinite. The Examiner also questions whether the terms "non-metal substrate compound" and "non-metal substrate" in claim 1 are referring to the same element.

Regarding the second issue, claim 1 has been amended for clarity to insert "compound" after "substrate" in line 10.

Applicants traverse the rejection regarding the assertion that the meaning of "non-metal substrate compound" is indefinite and withdrawal of the rejection is respectfully requested. The term non-metal substrate is a well-known term in chemistry and one of ordinary skill in the art would readily know its meaning. In chemistry, "metal" compounds have a defined set of properties and contain a defined set of chemical elements. A "non-metal" is defined as "a chemical element (as boron, carbon, phosphorus, nitrogen, oxygen, sulfur, chlorine, argon) that is not classified as a metal because it does not exhibit most of the typical metallic properties: an element that is in general is characterized

chemically by the ability to form anions, acidic oxides and acids and stable compounds with hydrogen." See Webster's Third New International Dictionary. Similarly, Grant & Hack's Chemical Dictionary provides defined meanings for both "metal" and "non-metals" (non-metallic). See the attached excerpt from Grant & Hack's Chemical Dictionary.

In addition, the term "substrate" is an accepted and well-known term in the field of physical organic chemistry. Attached hereto is an excerpt from the "Glossary of Terms Used in Physical Organic Chemistry (IUPAC Recommendations 1994)". The IUPAC (International Union of Pure and Applied Chemistry) is accepted as the governing body for the regulation of nomenclature in organic chemistry. The IUPAC glossary states regarding the definition of "substrate" that the term refers to "a chemical species, the reaction of which with some other chemical reagent is under observation (e.g. a compound that is transformed under the influence of a catalyst). The term should be used with care. Either the context or specific statement should always make clear which species in a reaction is regarded as the substrate...."

The meaning of the term "substrate" in the context of the invention is the same as the IUPAC stated definition. As such, the meaning of the term "non-metal substrate compound" in the specification and claims is well-defined in accordance with the accepted chemical meanings of "non-metal" and "substrate". One

skilled in the art would therefore readily know the metes and bounds of the claims and withdrawal of the rejection is respectfully requested.

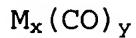
Claims 13 and 34 have been rejected for recitation of "at most 0.5-0.02". Claim 13, has been amended to delete "preferably at most 0.5, such as 0.5-0.02 molar equivalents". Regarding claim 34, "at most" has been deleted from the claim. Withdrawal of the rejections is therefore respectfully requested.

Rejections under 35 U.S.C. §102

Corey et al. - Claims 1, 5, 9, 12-13, 18, 24-27 and 35 have been rejected under 35 U.S.C. §102(b) as being anticipated by Corey et al. The Examiner alleges that Corey et al. teaches the carboxylation of organic halides via nickel carbonyl in protic acid. Corey is further alleged to disclose *trans*-1-bromo-2-phenylethylene as a non-metal substrate compound and Ni(CO)₄ as a metal carbonyl/metal catalyst. Applicants traverse this rejection and withdrawal thereof is respectfully requested.

The present invention, as encompassed by claim 1 is drawn to a method of performing a one-pot organic reaction, which includes carbon monoxide as reactant without the use of an external CO gas source, by

preparing a reaction mixture containing a non-catalyzing solid CO releasing compound which is a metal carbonyl of the general formula I,



wherein M is a metal, x is an integer, y is an integer, a non-metal substrate compound and a metal catalyst; wherein the metal carbonyl is not complexed with or bonded to the non-metal substrate compound prior to preparing the reaction mixture; and

exposing the reaction mixture to an energy source to release carbon monoxide from the CO releasing compound,

wherein carbon atoms of the released carbon monoxide form a bond with the non-metal substrate compound.

Applicants note that the teachings of Corey et al. are discussed on page 2 of the specification. Corey discloses the carboxylation of organic halides (substrate) with $Ni(CO)_4$ acting as both the catalyst and CO source. Thus, as stated by the Examiner, in Corey et al. the $Ni(CO)_4$ is a combined CX activator and CO releasing agent. However, the present invention requires that the CO releasing compound be a non-catalyzing solid compound. As noted, in Corey, the CO releasing compound is also the catalyst, i.e. $Ni(CO)_4$. As such, the reaction disclosed by Corey et al. is not encompassed by the present claims, and the present invention is not anticipated by Corey et al. Withdrawal of the rejection is respectfully requested.

Brunet et al. - Claims 1, 5-9, 12-13, 18, 24-27 and 35 have been rejected under 35 U.S.C. §102(b) as being anticipated by Brunet et al. Brunet et al. is asserted to disclose the cobalt carbonyl catalyzed carbonylation of aryl and vinyl halides using sunlamp-irradiated phase-transfer catalysis. The Examiner alleges that the cobalt carbonyl in Brunet et al. acts as both the catalyst and the source of the carbonyl. Applicants traverse this rejection and withdrawal thereof is respectfully requested.

Brunet et al. fails to teach every recited feature of the present invention. The present invention requires the use of "a non-catalyzing solid CO releasing compound." As noted by the Examiner, Brunet et al. teaches the use of the cobalt carbonyl compound $\text{Co}_2(\text{CO})_8$ as a catalyst. However, contrary to the assertion of the Examiner, Brunet et al. does not disclose the use of the cobalt carbonyl as a non-catalyzing solid CO releasing compound. Brunet et al. teach that the reaction is carried out under a CO atmosphere, which evidences that $\text{Co}_2(\text{CO})_8$ is not acting as a CO source in the reaction of the reference. As such, Brunet et al. fails to disclose each feature of the present invention and withdrawal of the rejection is respectfully requested.

Zoeller et al. - Claims 1, 5-9, 11, 13-14, 18, 20-27 and 31-35

have been rejected under 35 U.S.C. §102(b) as being anticipated by Zoeller et al. Zoeller et al. is asserted to disclose the molybdenum-catalyzed carbonylation of ethylene to propionic acid and anhydride. The Examiner alleges that in Zoeller et al. the molybdenum carbonyl acts as both a catalyst and a carbonyl source. Applicants traverse this rejection and withdrawal thereof is respectfully requested.

Zoeller et al. teaches a reaction wherein a metal carbonyl, $\text{Mo}(\text{CO})_6$, is used as a catalyst under a CO atmosphere. Thus, as with the cobalt carbonyl in Brunet et al., the molybdenum carbonyl in Zoeller et al. is not acting as a CO source. As such, Zoeller et al. similarly fails to teach each feature of the present invention because Zoeller et al. fails to teach a non-catalyzing solid CO releasing compound. Withdrawal of the rejection is therefore respectfully requested.

In summary, none of the references relied on by the Examiner (Corey et al., Brunet et al. and Zoeller et al.) teach every feature of the invention. The present invention requires the use of two separate metal compounds, a) a metal catalyst and b) a separate metal-based non-catalyzing solid CO releasing compound. Corey et al. disclose a single metal compound that acts as both the catalyst and CO source. Thus, Corey et al. does not teach the

invention, i.e. separate metal catalyst and metal non-catalyzing solid CO releasing compound. Brunet et al. and Zoeller et al. both teach a metal catalyst; however neither reference teaches a metal non-catalyzing solid CO releasing compound. As such, the invention, as claimed, is novel over the cited references and withdrawal of the rejections is respectfully requested.

Rejections under 35 U.S.C. §103

Claims 1, 5, 7-9, 12-13, 18, 24-27 and 35-36 have been rejected under 35 U.S.C. §103 as being obvious over Brunet et al. combined with Lidström et al. As discussed above, the Examiner alleges that the cobalt carbonyl in Brunet et al. acts as both the catalyst and the source of the carbonyl. Brunet et al. is asserted to only differ from the invention in failing to disclose the use of microwave energy as the energy source. Lidström et al. is asserted to teach the general use of microwave energy for organic synthesis reactions. Applicants traverse this rejection and withdrawal thereof is respectfully requested.

The invention is not *prima facie* obvious over Brunet et al. combined with Lidström et al. because the invention is not achieved even if the reference teachings are combined. As discussed above, Brunet et al. does not disclose the use of the cobalt carbonyl as a non-catalyzing solid CO releasing compound. Brunet et al. teaches that the reaction is carried out under a CO atmosphere, which

evidences that that $\text{Co}_2(\text{CO})_8$ is not acting as a CO source in the reaction of the reference.

Lidström et al. similarly fails to disclose the release of CO from a metal carbonyl, combined with using the released CO in a subsequent metal catalyzed carbonylation. As such, the invention is not achieved from the references and withdrawal of the rejection is respectfully requested.

The present invention also has unexpected, advantageous properties over the reactions of the references. There are important advantages associated with having a separate metal catalyst in an organic transformation, as recited in the present claims. To perform a metal-catalyzed carbonylation reaction with a metal carbonyl complex acting as a combined catalyst and CO source requires an unacceptable concentration of the metal carbonyl complex. Common metal carbonyl complexes have a maximum of six CO units per metal atom, resulting in the lowest possible catalyst concentration being 16.7%, which is a very high concentration for a catalyst to be.

In addition, in metal-catalyzed organic chemistry, the reaction conditions are fine-tuned by screening metal pre-catalysts, coordinating ligands, temperatures, bases (or acids), solvents, additives, etc. Such optimization becomes very difficult when the catalyst and CO source are combined in a single compound

because the pre-catalyst cannot be selected from non-carbonyl complexes or metal salts. As a result, only a very limited number of metal carbonyl complexes are available for each metal and the available complexes may not have the needed catalytic properties, such as solubility, stability activity etc. Further, the coordinated CO ligands may be released at temperatures that are either too high or too low to be suitable.

By using a separate non-catalyzing solid CO source in accordance with the invention, the difficulties discussed above are overcome. For example, the reaction temperature may be optimized according to the catalytic performance (i.e. the temperature may be selected to optimize the catalyst) and a separate CO releasing reagent may be selected which releases the CO at that optimum catalytic temperature. The present invention represents important improvements in the field of chemical reactions that are not possible with a combined catalyst and CO source. Thus, the feature of the invention that the CO source is a non-catalyzing solid CO releasing metal carbonyl compound results in advantages that are in no way suggested by the prior art.

Claims 1, 5-9, 11-14, 18, 20-27 and 31-36 have been rejected under 35 U.S.C. §103 as being obvious over Zoeller et al. combined with Lidström et al. As discussed above, the Examiner alleges that the molybdenum carbonyl in Zoeller et al. acts as both the

catalyst and the source of the carbonyl. Zoeller et al. is asserted to only differ from the invention in failing to disclose the use of microwave energy as the energy source. Lidström et al. is asserted to teach the general use of microwave energy for organic synthesis reactions. Applicants traverse this rejection and withdrawal thereof is respectfully requested.

The invention is not *prima facie* obvious over Zoeller et al. combined with Lidström et al. because the invention is not achieved even if the reference teachings are combined. As discussed above, Zoeller et al. does not disclose the use of the molybdenum carbonyl as a non-catalyzing solid CO releasing compound. In Zoeller et al. a CO atmosphere is used, which evidences that molybdenum carbonyl is not acting as a CO source in the reaction of the reference.

Lidström et al. similarly fails to disclose the release of CO from a metal carbonyl, combined with using the released CO in a subsequent metal catalyzed carbonylation. As such, the invention is not achieved from the references and withdrawal of the rejection is respectfully requested.

As discussed above under the rejection over Brunet et al. combined with Lidström et al., the present invention has unexpected, advantageous properties over the reactions of the references. By using a separate non-catalyzing solid metal carbonyl CO source in accordance with the invention the difficulties in the prior art reactions are overcome. For example,

the reaction temperature optimized according to the catalytic performance (i.e. the temperature may be selected to optimize the catalyst) and a separate CO releasing reagent may be selected which releases the CO at that optimum catalytic temperature. The present invention represents an important improvement in the field of chemical reactions that is not possible with a combined catalyst and CO source. Thus, the feature of the invention that the CO source is a non-catalyzing solid CO releasing metal carbonyl compound results in advantages that are in no way suggested by the prior art. Withdrawal of the rejection is therefore respectfully requested.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachments: 1) Excerpt from "Webster's Third New International Dictionary"
2) Excerpt from Grant & Hack's Chemical Dictionary
3) Excerpt from "Glossary of Terms Used in Physical Organic Chemistry (IUPAC Recommendations 1994)"

GRANT & HACKH'S CHEMICAL DICTIONARY

[American, International, European and British Usage]

*Containing the Words Generally Used in Chemistry,
and Many of the Terms Used in the Related
Sciences of Physics, Medicine, Engineering,
Biology, Pharmacy, Astrophysics,
Agriculture, Mineralogy, etc.*

Based on Recent Scientific Literature

FIFTH EDITION
Completely Revised and Edited by

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metabolism

protoplasm, reserve materials are stored up, and waste materials are eliminated. **basal** ~ The energy m. of an individual at rest. **constructive** ~ Anabolism. The processes which build complex from simpler compounds for growth and replacement of tissues. **destructive** ~ See *catabolism*. **energy** ~ The heat liberated by a living organism. **inborn error of** ~ A congenital disease due to absence or deficiency of an essential factor (usually an enzyme) in metabolism; as, absence of tyrosinase leads to the lack of melanin in albinism. See *phenylketonuria, galactosemia*. **synthetic** ~ Constructive m.

metabolite A breakdown product of a physiologically active substance (as, a drug) produced by body metabolism; usually having biological activity. **anti** ~ A substance that opposes metabolic reactions.

metaborate* See *metaborate under borate*.

metaboric acid* See *metaboric acid under boric acid*.

metacasein An intermediate protein in the digestion of caseinogen to casein by pancreatic juice.

metacellulose An isomer of cellulose (fungi and lichens), insoluble in cuprammonium.

metacenter The intersection of a vertical line through the center of buoyancy of a floating body, slightly displaced from its equilibrium position, with a line connecting the center of gravity and the equilibrium center of buoyancy. For stable flotation is should be above the center of gravity.

metacetaldehyde Metaldehyde.

metacetone Diethyl ketone*.

metacetonic acid Propionic acid*.

metachemistry See *metachemistry under chemistry*.

metachromatic Describing the property of certain substances which appear in different colors according to the wavelength of the light in which they are viewed.

metacinnabarite HgS . A black, native sulfide.

metacompound A derivative of benzene obtained by substitution of the first and third atoms.

meta-cresol See *meta-cresol under cresol*. **m.** purple Cresol purple. **m.**sulfonephthalein A pH indicator, changing at pH 2 from red (acid) to yellow (alkaline), and at pH 8.5 from yellow (acid) to purple (alkaline).

metacrolein $(CH_2:CHO)_n = 129.1$. Colorless crystals, m.45.

metacryotic Describing the liquid which separates gradually from frozen fruit juices.

metadiazine Pyrimidine*.

metaelement A hypothetical substance, intermediate between an element and a protyle.

metalfiltration Edge filtration through superimposed metallic strips with beveled edges, involving a change from coarse filtration (due to the strips) to fine filtration (due to the filter bed formed in their interstices).

metaformaldehyde 1,3,5-Trioxane.

metaiodate Iodate*.

metaiodic acid Iodic acid.

metaisocymophenol Carvacrol*.

metakliny An intramolecular transfer of groups. See *pinacol conversion*.

metal (1) An electropositive chemical element characterized by ductility, malleability, luster, conductance of heat and electricity, which can replace the hydrogen of an acid and forms bases with the hydroxyl radical. Metals and nonmetals differ in lattice structure, each atom being surrounded by 8-12 or 1-4 other atoms, respectively. Cf. *nonmetallic, periodic table*. (2) An alloy. **alkali** ~ See *alkali metals*. **alkaline-earth** ~ See *alkaline-earth metals*. **basic** ~ Base m. A m. that is readily oxidized. **bell** ~ An alloy of copper with 20% tin, used for casting bells. It has changed little over the

centuries. **Deva** ~ Trademark for a porous metal, impregnated with graphite; a solid lubricant. **fine** ~ White m. **fusible** ~ A m. or alloy of relatively low melting point, e.g., Na , Pb , Sn . **heavy** ~ A m. with a density above 4, located in the lower half of the *periodic table*, q.v. **light** ~ A m. with a density below 4, located in the upper part of the *periodic table*. **noble** ~ A m. that is not readily oxidized or dissolved in acid, e.g., Au or Pt . **precious** ~ Silver, gold, and platinum; they are rare in nature and difficult to isolate. **primary** ~ A m. used for the first time. Cf. *secondary metal*. **below**, **rare** ~ An element that occurs only in small quantities. **rare-earth** ~* See *rare-earth metals*. **secondary** ~ A m. recovered from waste or scrap. **sensitized** ~ M. treated with light-sensitive material, so that designs can be photographed on it directly. Used in the mass production of metallic articles. **type** ~ See *type metal*. **virgin** ~ Primary m. **white** ~ (1) Fine m. The almost pure cuprou sulfide obtained in the Welsh process for smelting Cu . (2) Alloys containing large proportions of Pb or Sn , e.g., *petite* m. **bath** A fusible metal (as lead), used to obtain a high temperature. **m. compounds** Intermetallic compounds, usually present in alloys. **m. detector** Device for detecting concealed m. (as, guns) or inadvertently added m. (as, in industrial processes); generally based on the change produced in a high-frequency electromagnetic field.

metalammine An ammine, q.v. (*ammines*), of a metal.

metalammonia compound Metalammamine.

metalalbumin Paralbumin. A protein from ovarian cysts.

metalceramics Powder metallurgy.

metaldehyde (1) $(O-CH\cdot Me)_n = (44.05)n$. Metacetaldehyde. Consists mainly of the tetramer, with higher cyclic oligomers. Colorless needles, sublimes 112, insoluble in water; a slug. Cf. *aldol, paraldehyde*.

metalepsis An early term (Dumas, 1834) to indicate a substitution.

metalepsy Substitution.

metalignitius Noncaking; as, of coals.

metallic (1) Pertaining to metals in their uncombined form. (2)* Describing elements with the characteristics of a metal. Cf. *semimetallic, nonmetallic*. **m. carbonyls** Compounds of carbon monoxide with metals; as, nickel carbonyl $Ni(CO)_4$. **m. soap** See *soap*.

metalliferous Describing an ore that contains a metal.

metallify (1) To convert into a metal. (2) To extract a m. from its ore. (3) To give metallic properties.

metalline Resembling a metal.

metallization A process by which a surface is coated with metal.

metallocene* Cyclopentadienylide. A metal derivative of bis(η -cyclopentadienyl) existing uncharged (as ferrocene) or charged ions; used in organic synthesis.

metallochrome A tint imparted to metal surfaces by n. salts.

metallogenic map A map showing the distribution of mineral deposits in relationship to geological formations and tectonic features.

metallography (1) The science of metals and of their production, properties, and uses. (2) The microscopic examination of the etched surfaces of metals and alloys. Cf. *mineralog*.

metalloid Semimetallic*.

metallurgy The science of preparing metals from their ores. Cf. *siderurgy*. **electro** ~ The electrical preparation of hydro ~ The preparation of metals by leaching processes. powder ~ The working of compressed metal powders obtained by reducing the corresponding oxides. They are formed into solid masses by heat and pressure, and so on.

name of ketone, are suffixes g named sound is molecule n, in
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nonacosane* $C_{29}H_{60} = 408.8$. A hydrocarbon in beeswax and *brassica*. Colorless wax, m.63.

nonacosanol* $C_{29}H_{59}OH = 424.8$. 1-~ Montanyl alcohol. White crystals, m.85, from beeswax and *Parosela barbata* (Leguminosae). 9-~ White solid, m.75. 10-~ m.75. 12-~ m.74. 14-~ m.79. 15-~ m.84.

nonacyclic (1) Having 9 rings; as violanthrone. (2) Not acyclic.

nonadecane* $C_{19}H_{40} = 268.5$. Enneadecane, enndecane. A solid, m.32.

nonadecanoic acid* $C_{18}H_{37}COOH = 298.5$. Nonadecylic acid. White leaflets, m.67.

nonadecanol* $C_{19}H_{39}OH = 284.5$. Nonadecyl alcohol. Opaque crystals, m.62.

nonadecanone* $(C_9H_{19})_2CO = 282.5$. 10-~ Caprinone, dinonyl ketone. Colorless leaflets, m.58, insoluble in water.

nonadecyl alcohol Nonadecanol*.

nonadecylic acid Nonadecanoic acid*.

nonaldehyde Nonanal*.

nonanal* $C_8H_{17}CHO = 142.1$. Pelargonaldehyde. b.191. In citron oil; used in perfumes.

nonane* $C_9H_{20} = 128.3$. Colorless liquid, d.0.718, b.149, insoluble in water. n. carboxylic acid Decanoic acid*.

n. dioic acid* Azelaic acid.

nonanediol* $CH_2OH \cdot (CH_2)_7CH_2OH = 160.3$. Nonamethylene glycol. Colorless liquid, b.149, slightly soluble in water.

nonanenitrile* $Me(CH_2)_7CN = 139.2$. Pelargononitrile. Colorless liquid, d.0.8331, b.224, insoluble in water.

nonanoate* A salt or ester of nonanoic acid, containing the radical $C_8H_{17}COO-$.

nonanoic acid* $C_8H_{17}COOH = 158.2$. Pelargonic acid, octanecarboxylic acid. An oxidation product of oleic acid, and a constituent of oil of *Pelargonium roseum*. Colorless leaflets, m.12, soluble in water; a flavoring.

nonanol* $C_9H_{20}O = 144.13$. 1-~ n-Nonyl alcohol. 2-~ $Me(CH_2)_6CHOHMe$. Heptylmethylcarbinol. Colorless liquid, b.193, insoluble in water. 3-~ $Me(CH_2)_5CHOHEt$. Ethylhexylcarbinol. Colorless liquid, b.194. 4-~ $Me(CH_2)_4CHOHPr$. Amylpropylcarbinol. Colorless liquid, b.192. 5-~ $[Me(CH_2)_3]_2CHOH$. Dibutylcarbinol. Oily liquid, b.194.

nonanone* $C_9H_{18}O = 142.14$. 2-~ Me-CO(CH₂)₆Me. Heptyl methyl ketone*. A constituent of rue and clove oils. Colorless liquid, b.195. 3-~ Et-CO(CH₂)₅Me. Ethyl hexyl ketone*, b.190. 5-~ [Me(CH₂)₃]₂CO. Dibutyl ketone*. Colorless liquid, b.187.

nonanoyl* Pelargonyl. The radical $Me(CH_2)_7CO-$, from nonanoic acid. n. chloride* $C_9H_{17}OCl = 176.7$. Pelargonyl chloride. Colorless liquid, b.215, decomp. by water.

nonconductor A substance that does not transmit electricity, heat, or light. Cf. insulator.

nondecyclic acid Nonadecanoic acid*.

nondrying oil A liquid fat that remains fluid on exposure; contains olein and glycerides of unsaturated fatty acids; e.g., castor oil.

nonene* $C_9H_{18} = 126.2$. Nonylene. 1-~ b.147; from tars, plants, fruit, animals. 2-~ b.144. 3-~ b.125.

nonferrous Other than iron.

nonine Nonyne*.

nonmetallic Describing an electronegative element in the upper right half of the periodic table. Nonmetals are generally polyvalent (except O and H), and exist in several stages of oxidation. Their oxides form acids. Cf. metallic, semimetallic.

nonoic acid Nonanoic acid*.

Nonox Trademark for aldolnaphthylamine derivatives; rubber antioxidants.

nonvalent Inert, having zero valency; as, neon.

nonwoven Describing any manufactured sheet, web or batt, of directional or random fibers, held together through mechanical, chemical, or physical methods, or any combination of these; but excluding weaving, knitting, stitching, bonding, traditional felting, as well as conventionally formed paper.

nonyl* The radical $-C_9H_{19}$, from nonane. n. alcohol* $C_9H_{19}OH = 144.3$. Colorless liquid, b.213, insoluble in water. For other isomers see nonanol. n. aldehyde Nonanal*. n. amine $C_9H_{19}NH_2 = 143.3$. Colorless liquid, b.195. n. cyanide Decanenitrile*.

nonylene Nonene*.

nonrylic acid Nonanoic acid*.

nonylone 9-Heptadecanone*.

nonyne* $Me(CH_2)_6C:CH = 124.2$. Heptylacetylene, nonine. Colorless liquid, b.160, insoluble in water.

nootarin $C_{15}H_{20}O_2 = 232.3$. A cycloheptatrienone, m.95.

nootkatone $C_{15}H_{22}O = 218.3$. A sesquiterpene ketone flavoring in grapefruit. m.36.

nopinene β -Pinene.

nor- Prefix indicating: (1)* Replacement by H of a Me group attached to a ring system; used particularly for terpenes. (2)* Elimination of one CH₂ group from a chain or ring; used particularly for higher terpenes and steroids. Cf. dinor, trinor. (3) Usage to denote replacement by H of all Me groups in a monoterpene ring system has been abolished by IUPAC.

noradrenaline acid tartrate EP, BP name for norepinephrine bitartrate.

noratropine An alkaloid from various Solanaceae species, allied to atropine.

Norbide B₄C. Trademark for boron carbide, formed by heating coke and boric acid in an electric furnace. Second to diamond in hardness; used for grinding, deoxidizing steel; also as an abrasion-resistant.

norbixin See bixin.

norcamphane Trinorbornane*. dimethylmethylen~ Camphene*. trimethyl~ Bornane*.

norcamphanyl The trinorbornyl* radical.

nordenskioldine (Swedish) $CaSnB_3O_6$. A tin ore.

Nordhausen acid Oleum.

nordihydroguaiaretic acid A natural antioxidant for fats, from *Larrea divaricata*, the creosote bush of Mexico.

nordmarkite A ferrromagnesian-feldspathic soda syenitic rock, from Norway.

norephedrene $Ph \cdot CH(OH) \cdot CH(NH_2)Me = 151.2$. 2-Amino-1-phenyl-1-propanol*. Used to control allergic conditions of the nose, e.g., hay fever.

norepinephrine bitartrate $C_9H_{11}O_3N \cdot C_4H_6O_6 \cdot H_2O = 337.3$. α -(Aminomethyl)-3,4-dihydroxybenzylalcohol tartrate. Noradrenaline acid tartrate, leventerol. Levophed. White crystals, m.102, soluble in water. A hormone produced in the adrenal medulla, and also present at the sympathetic nerve endings, where it is a chemical transmitter of impulses. It has a constricting effect on blood vessels and is used to raise blood pressure (USP, EP, BP).

norepol Agripol.

Noresal Trademark for a whipped-up mixture of glue, glycerol, glucose, peanut hulls, saponin, water, and formaldehyde; a cork substitute.

norethindrone $C_{20}H_{26}O_2 = 298.4$. 17-Hydroxy-19-nor-17 α -pregn-4-en-20-yn-3-one. Norethisterone. White crystals, m.203, insoluble in water. A progestational steroid. Used for menstrual abnormalities and in oral contraceptives (USP, BP).

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Gold Book

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International Union of Pure and Applied Chemistry

Compendium of Chemical Terminology

"The Gold Book"

Second edition, 1997

Edited by A D McNaught and A Wilkinson
[ISBN 0-8-654-26848].

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(IUPAC Recommendations 1994)

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St to Sy and sigma

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substrate

A chemical species, the reaction of which with some other chemical reagent is under observation (e.g., a compound that is transformed under the influence of a catalyst). The term should be used with care. Either the context or a specific statement should always make it clear which chemical species in a reaction is regarded as the substrate. See also transformation.